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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	**10/594,636**
Filing Date	September 28, 2006
Inventor(s)	Yoshiharu OHTA et al.
Group Art Unit	1793
Examiner Name	Michael Marcheschi
Attorney Docket Number	2691-000051/US

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
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  - ☐ Affidavits/declaration(s)
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name John W. Fitzpatrick	Reg. No. 41,018
Signature			
Date	December 9, 2008		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:
Yoshiharu OHTA, et al.

Application No.: 10/594,636

Examiner: Michael A. Marcheschi

Filed: September 28, 2006

Docket No.: 2691-000051/US

For: SEMICONDUCTOR POLISHING COMPOUND

BRIEF ON APPEAL

Appeal from Group 1793

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is NITTA HAAS INCORPORATED, by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 018396, Frame 0721.

II. STATEMENT OF RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences, or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

Claims 1-18 are pending.

Claims 1-18 stand rejected.

Claims 1-18 are on appeal.

IV. STATUS OF AMENDMENTS

No amendments have been made to the pending claims during prosecution of the present application. Arguments were submitted on April 9, 2008, in response to the first Office Action mailed on October 10, 2008. A second and Final Office Action was issued on May 16, 2008. This Appeal is from the Final Rejection of the pending claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The subject matter of the present application relates to a semiconductor polishing composition that is an aqueous dispersion solution of fumed silica and can efficiently polish a semiconductor device, such as a wafer, at a high polishing speed without causing a polishing flaw (paragraph [0017] of the Substitute Specification).

Independent claim 1 describes, a semiconductor polishing composition 5 (Fig. 1; [0069]) comprising:

fumed silica, the semiconductor polishing composition 5 being an aqueous dispersion solution of fumed silica ([0018], [0027], [0072]-[0079), wherein

a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica ([0079]; Figs. 2, 3A, 3C).

Dependent claim 4 describes the semiconductor polishing composition 5 (Fig. 1; [0069]) of claim 1, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition 5 has a particle size of the maximum frequency in a range of 80 to 115 nm ([0021], [0029]; Figs. 3A, 3C).

Dependent claim 9 describes the semiconductor polishing composition 5 (Fig. 1; [0069]) of claim 2, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition 5 has a particle size of the maximum frequency in a range of 80 to 115 nm ([0021], [0029]; Figs. 3A, 3C).

Dependent claim 10 describes the semiconductor polishing composition 5 (Fig. 1; [0069]) of claim 3, wherein, in a particle size distribution by volume of the fumed silica, the

semiconductor polishing composition 5 has a particle size of the maximum frequency in a range of 80 to 115 nm ([0021], [0029]; Figs. 3A, 3C).

Dependent claim 11 describes the semiconductor polishing composition 5 (Fig. 1; [0069]) of claim 8, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition 5 has a particle size of the maximum frequency in a range of 80 to 115 nm ([0021], [0029]; Figs. 3A, 3C).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

1) Claims 1-18 stand rejected under 35 U.S.C. §102(a) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as obvious over WO 2005/007770 to Chu, et al. (Chu).
2) Claims 1-3, 5-8, 12, 13, 15, 16 and 18 stand rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as obvious over US Patent Application Publication 2004/0040217 to Takashina, et al. (Takashina).
3) Claims 4, 9-11, 14, and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Takashina.

VII. ARGUMENTS

A. Claim Rejections Over Chu

1. Claims 1-18 Are Not Anticipated By Chu.

Claims 1-18 stand rejected under 35 U.S.C. §102(a) as being anticipated by WO 2005/007770 to Chu, et al. (Chu).

Under 35 U.S.C. §102(a), a person shall be entitled to a patent unless the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent. Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim...A prior art reference that 'almost' meets that standard does not anticipate. *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548, 220 USPQ 193, 198 (Fed. Cir. 1983).

It is alleged in the Final Office Action that Chu discloses all of the features recited in the rejected claims. However, Chu fails to disclose or suggest each and every feature recited in the rejected claims. For example, Chu fails to disclose or suggest, a semiconductor polishing composition, comprising fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica, wherein a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica, as recited in independent claim 1.

Chu relates to an abrasive composition for polishing substrates, including a plurality of abrasive particles having a polydisperse particle size distribution with median particle size, by volume, being about 20 nm to about 100 nm. The fraction of particles greater than about 100 nm is less than or equal to about 20% by volume of the abrasive particles (paragraph [0015] of Chu).

Chu discloses colloidal silica as being "particularly suitable" for the invention as polydisperse colloidal silica (paragraph [0027]). Suitable distributions of the polydisperse colloidal silica are such that the median particle size, by volume is about 20 nm to about 100 nm; the span value, by volume, is greater than or equal to about 15nm; and the fraction of particles greater than 100 nm is less than or equal to about 20% by volume of the abrasive particles. The

distribution has a relatively broad span including particles that are relatively large (e.g., above 100 nm). Such large particles contribute to scratching and the appearance of defects on the surface of the substrate subsequent to the CMP process.

Additionally, the presence of a significant quantity of large particles (e.g., greater than 100 nm) in the dispersion may result in settling during storage (paragraph [0027]). Even in a most preferred embodiment, Chu includes a fraction of particles that is greater than 100 nm by volume (see paragraph [0028]). Thus, unlike the semiconductor polishing composition recited in rejected claims, Chu teaches the use of colloidal silica that has particles greater than 100 nm. As such, Chu fails to disclose a fumed silica having the particle diameter, in the volume amount, as claimed and, therefore, Chu demonstrates the problems being addressed in the instant application due to use of a colloidal silica.

2. Claims 1-18 Are Not Rendered Obvious By Chu.

Claims 1-18 also stand rejected under 35 U.S.C. §103(a) as obvious over Chu. Specifically, it is alleged that the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping range disclosed by the reference.

Under 35 U.S.C. §103(a) a patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Initially, Appellants submit the references must be considered as a whole, including portions that would lead away from the claimed invention, as suggested in MPEP § 2141.02(V). *W.L Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). As such, Appellants submit the Examiner must consider the significant differences of the abrasive composition of Chu and the claimed polishing composition.

As discussed above, Chu teaches the use of colloidal silica and not a fumed silica, as recited in the rejected claims. Further, contrary to the allegation in the final rejection of the

claims that the rejected claims are rendered obvious by Chu, Chu actually teaches away from the use of fumed silica and therefore, it would not have been obvious to one of ordinary skill in the art at the time of the invention to select fumed silica in the range as alleged.

For example, Chu recognizes problems associated with fumed particles at paragraph [0009]. Further, at paragraph [0051] Chu demonstrates the preferred use of colloidal silica when compared to otherwise identical slurries containing precipitated silica, fumed silica and colloidal alumina. At paragraph [0052] Chu summarizes the results of Table 1 as clearly showing "that the polydisperse colloidal silica provides the greatest removal rate while providing a polished surface quality that is superior (smoother) than that achieved with the other three abrasives" (see also Tables II and III).

Moreover, Chu recognizes the stability of colloidal silica relative to fumed silica and for this reasons chooses colloidal silica as being "particularly suitable" for the purposes of the invention (see, for example, paragraph [0026] recognizing that colloidal silica is more stable, i.e., less agglomeration of particles). Thus, Chu actually teaches away from the use of fumed silica and therefore does not anticipate or render obvious the rejected claims.

Further, in Chu at paragraph [0020], a shape of fumed silica particles is described to be jagged irregular shape. In contrast a shape of colloidal silica particles is spherical. It is clear that there is a large difference between the two types of silica particles in their respective abrasion characteristics. In Chu, the colloidal silica particles are described without providing any description of the difference in the abrasion characteristics between the fumed silica particles and the colloidal silica particles. However, Chu defines a particle distribution alleged to improve a surface condition of a substrate polished by the colloidal silica particles. Thus, it is clear that the defined particle distribution can not be applied to the fumed silica particles because the shape and abrasion characteristic of the fumed silica particles is entirely different from that of the colloidal silica particles. The fumed silica is described only in the Comparative Examples and although the fumed silica is described as one of the polishing materials in paragraph [0009], the description is merely an enumeration. It is clear that the particle distribution of fumed silica particles is not taught in or suggested from the Chu reference.

3. Claims 4, 9, 10 and 11 are Not Anticipated or Rendered Obvious by Chu

Claim 4 recites, the semiconductor polishing composition of claim 1, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm. Claims 9-11 recite similar subject matter but depend from claims 2, 3 and 8, respectively.

In Chu, particles having a diameter of about 60 to 90 nm appear to be present in the maximum frequency by volume with a rapid drop off at a diameter of about 90 nm (see Fig. 1 of Chu). Thus, Chu fails to disclose or suggest a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

Although there may be a small overlap in the ranges between the size of the colloidal particles of Chu and the fumed silica particles of the rejected claims, a critical difference exists between the properties of the particles that distinguish the claimed particles from those of Chu. For example, as recognized by Chu at paragraph [0009], agglomerated particles of fumed silica have a jagged and irregular shape which will cause polishing flaws to a semiconductor device. It is due to the known instability of fumed silica that causes the particles to agglomerate and form particles having such jagged and irregular shapes that Chu teaches the use of the colloidal silica particles in the range shown in Fig. 1.

Moreover, as Chu teaches away from the use of fumed silica due to the characteristics discussed above, Chu does not render claims 4, 9, 10 and 11 obvious.

B. Claim Rejections Over Takashina.

1. Claims 1-3, 5-8, 12, 13, 15, 16 and 18 Are Not Anticipated or Rendered Obvious By Takashina

Claims 1-3, 5-8, 12, 13, 15, 16 and 18 stand rejected under 35 U.S.C. §102(b) as being anticipated by or in the alternative, under 35 U.S.C. §103(a) as obvious over US Patent Application Publication 2004/0040217 to Takashina, et al. (Takashina).

Under 35 U.S.C. §102(b) a person shall be entitled to a patent unless the invention was patented or described in a printed publication in this or a foreign country or in public use or on

sale in this country, more than one year prior to the date of the application for patent in the United States.

Under 35 U.S.C. §103(a) a patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Takashina fails to disclose or suggest each and every feature recited in rejected claims. For example, Takashina fails to disclose or suggest, a semiconductor polishing composition comprising, fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica, wherein a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica.

Takashina relates to a polishing composition for polishing semiconductor substrate (paragraph [0002]). Like Chu, Takashina also discusses disadvantages in the use of fumed silica as a polishing particle (paragraph [0005]). For example, Takashina recognizes disadvantages to the use of fumed silica due to scratches generated on a surface of a polished semiconductor device because of aggregated particles. It is due to the non-aggregative properties of colloidal silica that colloidal silica is used over fumed silica in Takashina.

As clearly stated in Takashina, among the inorganic particles, colloidal silica particles are the most preferable and can be prepared as a raw material (paragraph [0037]). Thus, Takashina does not disclose or suggest a semiconductor polishing composition comprising fumed silica having a particle diameter of 100 nm or less. Rather, Takashina merely discloses the use of abrasive particles and more preferably discloses the use of colloidal silica particles and therefore merely demonstrates the problems being addressed in the present application due to the use of colloidal silica.

Also, Takashina discloses that (1) because agglomerated particles are formed from fumed silica particles in manufacturing process, they easily induce scratches to a surface of a substrate; and (2) because colloidal silica particles are relatively spherical, and agglomerated particles are hardly formed therefrom, they occur little scratches to a surface, but polishing rate is slow.

Because an object of Takashina is to improve the polishing rate, it is clear that Takashina concerns colloidal silica particles. Therefore, the particle distribution defined to improve the polishing rate of colloidal silica can not apply to the particle distribution of fumed silica particles. Thus, the particle distribution of fumed silica particles is not taught in or suggested in Takashina.

2. Claim 4, 9, 10 and 11 Are Not Rendered Obvious By Takashina.

Claims 4, 9, 10 and 11 stand rejected under 35 U.S.C. §103(a) as obvious over US Patent Application Publication 2004/0040217 to Takashina, et al. (Takashina).

Claims 4, 9, 10 and 11 recite a particle size distribution by volume of fumed silica, the semiconductor polishing composition has a particle size of maximum frequency in a range of 80 to 115 nm.

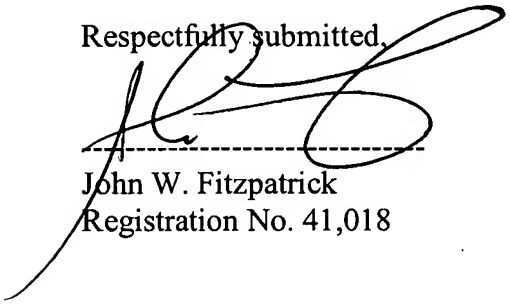
In contrast, Takashina discloses abrasive particles having a diameter of 2 to 200 nm in an amount of 50% by volume. However, Takashina is silent regarding a maximum frequency range of particle diameter. It is alleged in the Office Action that because Takashina discloses a maximum particle size of 200 nm a range is provided that encompasses the claimed values and that it would have been obvious to one of ordinary skill in the art to select the overlapping portion of the range disclosed by the reference.

However, Takashina fails to disclose or suggest a range of particle size having a maximum frequency. Rather, Takashina merely discloses a range of particle size (i.e., 2 to 200 nm). As there is no range of particle size having a maximum frequency, there can be no overlap of ranges. Further, as Takashina discloses only a general range of particle size there is no way of determining what particle diameters appear at a maximum frequency. For example, there may be no particles in a range of 80 to 115 nm. Therefore, Takashina fails to render claims 4, 9, 10 and 11 obvious.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 1-18 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejection of claims 1-18 and allow all pending claims.

Respectfully submitted,



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APPENDIX A – CLAIMS APPENDIX

1. A semiconductor polishing composition comprising:

fumed silica, the semiconductor polishing composition being an aqueous dispersion solution of fumed silica,

wherein a content of the fumed silica having a particle diameter of 100 nm or less is 15% by volume or more based on a total amount of the fumed silica.

2. The semiconductor polishing composition of claim 1, wherein a content of fumed silica having a particle diameter of 100 nm or less is in a range of 15 to 90% by volume based on a total amount of the fumed silica.

3. The semiconductor polishing composition of claim 1, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 115 nm or less.

4. The semiconductor polishing composition of claim 1, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

5. The semiconductor polishing composition of claim 1, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.

6. The semiconductor polishing composition of claim 1, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

7. The semiconductor polishing composition of claim 6, wherein a pH of the alkali aqueous solution is in a range of 12 to 14.

8. The semiconductor polishing composition of claim 2, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 115 nm or less.

9. The semiconductor polishing composition of claim 2, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

10. The semiconductor polishing composition of claim 3, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

11. The semiconductor polishing composition of claim 8, wherein, in a particle size distribution by volume of the fumed silica, the semiconductor polishing composition has a particle size of the maximum frequency in a range of 80 to 115 nm.

12. The semiconductor polishing composition of claim 2, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.

13. The semiconductor polishing composition of claim 3, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.

14. The semiconductor polishing composition of claim 4, wherein a content of the fumed silica is in a range of 10 to 30% by weight based on a total amount of the composition.

15. The semiconductor polishing composition of claim 2, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

16. The semiconductor polishing composition of claim 3, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

17. The semiconductor polishing composition of claim 4, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

18. The semiconductor polishing composition of claim 5, wherein the semiconductor polishing composition is prepared by adding an acidic fumed silica dispersion solution to an alkali aqueous solution.

APPENDIX B – EVIDENCE APPENDIX

None

APPENDIX C – RELATED PROCEEDINGS APPENDIX

None